Assignment 4

1. let:

S1, Super Saver rentals type 1

S2, Super Saver rentals type 2

D1, Deluxe rentals type 1

D2, Deluxe rentals

B2, Business rentals type 2

Max Profit = 30 S1 + 20 S2 6 + 35 D1 + 30 D2 + 40 B2

Constraint:

S1+S2 <= 130

D1+D2 <= 60

B2 <= 50

S1,S2,D1,D2,B2 >= 0

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | |  |  |  |  |
|  | SS | Deluxe | Business | Available |  |
| Type 1 | 30 | 35 |  | 100 |  |
| Type 2 | 20 | 30 | 40 | 120 |  |
| Demand | 130 | 60 | 50 |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Model |  |  |  |  |  |
|  | SS | Deluxe | Business | Total |  |
| Type 1 | 100 | 0 |  | 100 |  |
| Type 2 | 10 | 60 | 50 | 120 |  |
| Total | 110 | 60 | 50 |  |  |
|  |  |  |  |  |  |
| Profit | 7000 |  |  |  |  |
|  |  |  |  |  |  |

Answer Report

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Objective Cell (Max) | | |  |  |  |  |  |
|  | **Cell** | **Name** | **Original Value** | **Final Value** |  |  |  |
|  | $B$15 | Profit SS | 0 | 7000 |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Variable Cells | | |  |  |  |  |  |
|  | **Cell** | **Name** | **Original Value** | **Final Value** | **Integer** |  |  |
|  | $B$11 | Type 1 SS | 0 | 100 | Contin |  |  |
|  | $C$11 | Type 1 Deluxe | 0 | 0 | Contin |  |  |
|  | $B$12 | Type 2 SS | 0 | 10 | Contin |  |  |
|  | $C$12 | Type 2 Deluxe | 0 | 60 | Contin |  |  |
|  | $D$12 | Type 2 Business | 0 | 50 | Contin |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Constraints | | |  |  |  |  |  |
|  | **Cell** | **Name** | **Cell Value** | **Formula** | **Status** | **Slack** |  |
|  | $B$13 | Total SS | 110 | $B$13<=$B$6 | Not Binding | 20 |  |
|  | $C$13 | Total Deluxe | 60 | $C$13<=$C$6 | Binding | 0 |  |
|  | $D$13 | Total Business | 50 | $D$13<=$D$6 | Binding | 0 |  |
|  | $E$11 | Type 1 Total | 100 | $E$11<=$E$4 | Binding | 0 |  |
|  | $E$12 | Type 2 Total | 120 | $E$12<=$E$5 | Binding | 0 |  |
|  |  |  |  |  |  |  |  |

Sensitivity Report

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Variable Cells | | |  |  |  |  |  |
|  |  |  | **Final** | **Reduced** | **Objective** | **Allowable** | **Allowable** |
|  | **Cell** | **Name** | **Value** | **Cost** | **Coefficient** | **Increase** | **Decrease** |
|  | $B$11 | Type 1 SS | 100 | 0 | 30 | 1E+30 | 5 |
|  | $C$11 | Type 1 Deluxe | 0 | -5 | 35 | 5 | 1E+30 |
|  | $B$12 | Type 2 SS | 10 | 0 | 20 | 5 | 20 |
|  | $C$12 | Type 2 Deluxe | 60 | 0 | 30 | 1E+30 | 5 |
|  | $D$12 | Type 2 Business | 50 | 0 | 40 | 1E+30 | 20 |
|  |  |  |  |  |  |  |  |
| Constraints | | |  |  |  |  |  |
|  |  |  | **Final** | **Shadow** | **Constraint** | **Allowable** | **Allowable** |
|  | **Cell** | **Name** | **Value** | **Price** | **R.H. Side** | **Increase** | **Decrease** |
|  | $B$13 | Total SS | 110 | 0 | 130 | 1E+30 | 20 |
|  | $C$13 | Total Deluxe | 60 | 10 | 60 | 10 | 20 |
|  | $D$13 | Total Business | 50 | 20 | 50 | 10 | 20 |
|  | $E$11 | Type 1 Total | 100 | 30 | 100 | 20 | 100 |
|  | $E$12 | Type 2 Total | 120 | 20 | 120 | 20 | 10 |

1. According to the model, the demand for super saver cannot be accommodated.

110 reservations can be accommodated for super saver, 60 for deluxe, and 50 for business.

1. Looking in the constraints from the sensitivity report, we notice that increasing 1 unit of type 1, will increase the profit by $30; whereas the profit will increase only by $20 if we increate 1 unit of type 2. Therefore, I will recommend converting the office to type 1.
2. Yes, we would need the forecast of demand for each rental class on the next night.

Using the demand forecast, we would modify the capacities of the first three constraints and resolve